REMARKS

The present invention is an audio apparatus and a method for transmitting an ultrasonic pressure wave into a non-linear medium for demodulation. In accordance with an embodiment of the invention, a radio telephone having an audio apparatus is illustrated in Fig. 3. The radio telephone includes a receiver 5 which receives a broadcast signal from a base station via an antenna 6. The receiver demodulates the received digital signal and passes the demodulated signal 21 to the channel decoder 4 which corrects for bit errors that occur during transmission. The decoded digital signal is provided to a speech decoder 3 which decodes the speech and passes the digital decoded signal to an audio apparatus 2 which generates an acoustic representation of the received speech signal. See the first paragraph under the Detailed Description of the Invention.

An embodiment of the audio apparatus 2 is illustrated in Fig. 4. In accordance with the embodiment of Fig. 4, the prior art is improved upon by modifying the audio signal to compensate for the conversion characteristics of the transducer which is provided by transducer response filter 8. See page 6, lines 24-26 of the original specification. Compensation for the effects of the demodulation process and the transducer conversion characteristics permit the size of the transducer to be reduced while retaining performance. See page 4, lines 8-11 of the original specification.

The state of the art prior to the invention is described at the bottom page 2 and at the top of page 3 of the specification as processing the audio signal prior to modulation to minimize the effects of coloration and distortion that result from the interaction of the ultrasonic wave with the non-linear medium. That processing is

described as "[t]he processing typically comprises a double integration filter to compensate for colorization of the audio signal and a square root operator to compensate for the distortion of the audio signal" (emphasis added). The prior art processing steps described above, and as taught in Ricoh '199 discussed below regarding double integrator 10, do not correspond to the modification of the audio signal to compensate for the conversion characteristics of the transducer as recited in independent claims 10, 19, and 20.

Claims 10-13 and 19 stand rejected under 35 U.S.C. §102 as being anticipated by JP 60-075199 (Ricoh '199). These grounds of rejection are traversed for the following reasons.

The Examiner's statement of the grounds of anticipation of claim 10 include in part :

> "and double integral (10, Fig. 4) for modifying the audio signal to compensate for the characteristics of the transducer (9; double integral increases amplitude of modulating signal thus increasing amplitude of 2nd harmonic audio output; see machine translation pages 12-13 and pages 25-26). It should be noted that the double integral does not provide flat frequency response characteristics, it still compensate (emphasis added".

The Examiner's conclusion regarding the double integral is incorrect in that, as stated above from Applicant's specification, it is well known that the double integration provides compensation for the effects of colorization and distortion that result from interaction of the ultrasonic wave with the non-linear medium which is not compensation for conversion characteristics of the transducer as recited in the claims.

Submitted herewith is a translation, which has been obtained by British counsel of the Assignee, of the Ricoh '199 reference. It is requested that the Examiner make the translation of record in the file in the attached PTO Form 08A.

The Examiner is referred in the translation to the bottom of page 7 and the continuing text on page 8 regarding the description of the embodiments of Figs. 3 and 4. As may be seen, the double integrator 10 of Ricoh '199 is utilized in the embodiment of Fig. 4. Moreover, with respect to the double integrator, it is further stated on page 8 as follows:

> Thus the reproduced sound pressure is proportional to the second-differential of the original modulating signal. Therefore it is possible to obtain reproduced sound pressure proportional to the original modulating signal by passing the modulating signal through a double integrator prior to modulation, as shown in Fig. 4.

This statement does not suggest to a person of ordinary skill in the art that double integration is to provide compensation for the transducer.

As may be seen from a comparison of Fig. 4 with that of the present invention, the filter 7 of Fig. 4 of the present application is also a double integration filter which precedes the transducer response filter 8 upon which the claimed subject matter is based pertaining to compensation for the conversion characteristics of the transducer. In other words, Ricoh '199 utilizes a double integration filter 10, which performs the same function as the double integration filter 7 of the preferred embodiment of the present invention, that is described on page 6 of the specification of the present application as "compensates for the effect of colorization that occurred during the self-modulation process...". In the next paragraph of the present invention it is stated that "[t]he transducer response filter 8 corrects for characteristics of the ultrasonic transducer 15..." which is a wholly different function.

It is submitted that a person of ordinary skill in the art, considering the translation of Ricoh '199 and the specification of the present invention, understands that, contrary to the Examiner's assertion, a person of ordinary skill in the art would not consider the double integrator 10 of Ricoh '199 to anticipate the claimed subject matter which is specific to compensating for conversion characteristics of the transducer. If the Examiner persists in the stated grounds of rejection, it is requested that he point out on the record how the explanation of Applicant's specification regarding a double integration filter 7 is not applicable to the double integration filter 10 of the embodiment of Fig. 4 of Ricoh '199 as justifying a conclusion that the double integration filter 10 of Ricoh '199 modifies the audio signal to compensate for the demodulating properties of the non-linear medium, as clearly taught at the bottom of page 2 and at the top of page 3 of Applicant's specification and, as quoted above from the translation, which is not compensation for the conversion characteristics of the transducer.

Moreover, it should be noted that each of the independent claims further recites compensation for the demodulating properties of the non-linear medium which is based upon the filter 7 of Fig. 4 of the present application which is what the double integrator 10 of Ricoh '199 is understood by persons of ordinary skill in the art to be. It is submitted that the Examiner has no justifiable basis, in effect, to be asserting that the prior art double integration filter 7 of the present application and 10 in Ricoh '199, which compensates for the demodulating properties of the non-linear medium, also compensates for conversion characteristics of the transducer.

Dependent claims 11 and 12 further limit claim 10 regarding amplitude modulation of the ultrasonic signal which is not anticipated by Ricoh '199 for the reasons set forth above.

Claim 19 is patentable for the same reasons set forth above with respect to claim 10 in that the last step of claim 19 recites "modifying the audio signal, before modulating the first ultrasonic signal, to compensate for the conversion characteristics of the transducer" and which further recites, "modifying the audio signal, before modulating the first ultrasonic signal, to compensate for the demodulating properties of the non-linear medium" which, as described above, is the function performed by the double integrator 10 of Ricoh '199. The Examiner cannot permissively read both compensation functions on the double integrator 10 of Ricoh '199.

Claims 14-15 and 20-24 stand rejected under 35 U.S.C. §103 as being unpatentable over Ricoh '199 further in view of Nippon '293. These grounds of rejection are traversed for the following reasons.

Nippon '293 does not cure the deficiencies noted above with respect to Ricoh '199. It is noted that Nippon '293 has been cited as teaching an electroacoustic transducer in which an equalizer is located between a modulator and a program source to smooth frequency response characteristics for compensating transducer output. It should be noted that claim 14 recites that the means for modifying is disposed between the double integration filter and the square root operator and is dependent upon claim 13 that recites that the processing means comprises a double integration filter and a square root operator. The Examiner has cited the equalizer 4 as being located between a modulator 6 and program source 3

to smooth the frequency response characteristic for the compensating transducer output. However, what is stated in the Abstract is that "when the signal passes through equalizer 4, the sound pressure generated in air is expressed as equation 3, the sound pressure is proportional to the audio signal of program source 3, no omega is included in the proportional coefficient, allowing to obtain the flat frequency response." There is clearly no teaching therein regarding compensation for conversion characteristics of the transducer as suggested by the Examiner. Moreover, the location of the equalizer would not suggest to a person of ordinary skill in the art the placement of the means for modifying as being between the double integration filter and the square root operator since neither of those elements are present in Nippon '293.

Claim 20 is patentable for the same reasons set forth above with respect to independent claims 10 and 19 in that the combined teachings of Ricoh '199 and Nippon '293 do not suggest the modification of the audio signal to compensate for the conversion characteristics of the transducer. Moreover, dependent claims 21-24 are patentable for the same reasons set forth above regarding the claims dependent from claim 10.

Claim 16 stands rejected under 35 U.S.C. §103 as being unpatentable over Ricoh '199 in view of United States Patent 4,823,908 (Tanaka). These grounds of rejection are traversed for the following reasons.

Claim 16 further limits claim 10 in reciting that the characteristics of the means for modifying are empirically derived by tone adjustment. Tanaka has been cited as teaching a parametric loudspeaker system wherein the characteristics of the means for modifying are empirically derived by tone adjustment. The referenced

portions of Tanaka, which are Figs. 22, 23, 24 and 26 in column 12, lines 43-53, do not suggest the claimed compensation for the conversion characteristics of the transducer.

Therefore, if the proposed combination of Tanaka were made with Ricoh '199, the subject matter of independent claim 10 would not be achieved. Moreover, the more specific subject matter of claim 16 would also not be achieved in that there is no suggestion of even the compensation for the transducer in the proposed combination of Ricoh '199 and Tanaka let alone that the characteristics of the means for modifying are empirically derived by tone adjustment as recited in claim 16.

Claims 17 and 18 stand rejected under 35 U.S.C. §103 as being unpatentable over Ricoh '199 further in view of United States Patent 5,539,705 (Akerman et al). These grounds of rejection are traversed for the following reasons.

Akerman et al have been cited as teaching a portable wireless communication apparatus which includes an ultrasonic receiving. However, the teachings of Akerman et al do not cure the deficiencies noted above with respect to claim 10.

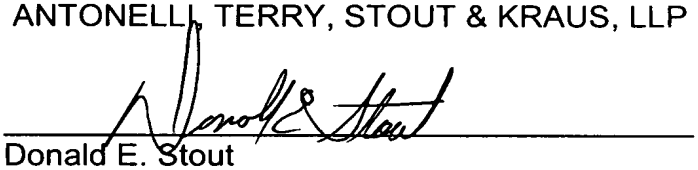
Claims 25 and 26 stand rejected under 35 U.S.C. §103 as being unpatentable over Ricoh '199 in view of Nippon '293 further in view of Akerman et al. Claims 25 and 26 are patentable for the same reasons set forth above with respect to claims 17 and 18 in that the teachings of Akerman et al do not cure the deficiencies noted above with respect to Ricoh '199 and Nippon '293.

In view of the foregoing amendments and remarks, it is submitted that each of the claims in the application is in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case no. 1156.38589X00).

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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